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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/243,689	02/03/1999	RICHARD M. WASSERMAN	101473	2795

25944 7590 03/25/2005

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EXAMINER	
GARCIA OTERO, EDUARDO	

ART UNIT	PAPER NUMBER
2123	

DATE MAILED: 03/25/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Advisory Action Before the Filing of an Appeal Brief	**Application No.** 09/243,689	**Applicant(s)** WASSERMAN, RICHARD M.	
	Examiner Eduardo Garcia-Otero	**Art Unit** 2123	

--The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

THE REPLY FILED 11 March 2005 FAILS TO PLACE THIS APPLICATION IN CONDITION FOR ALLOWANCE.

1. ☒ The reply was filed after a final rejection, but prior to filing a Notice of Appeal. To avoid abandonment of this application, applicant must timely file one of the following replies: (1) an amendment, affidavit, or other evidence, which places the application in condition for allowance; (2) a Notice of Appeal (with appeal fee) in compliance with 37 CFR 41.31; or (3) a Request for Continued Examination (RCE) in compliance with 37 CFR 1.114. The reply must be filed within one of the following time periods:
   a) ☒ The period for reply expires 3 months from the mailing date of the final rejection.
   b) ☐ The period for reply expires on: (1) the mailing date of this Advisory Action, or (2) the date set forth in the final rejection, whichever is later. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of the final rejection.
   Examiner Note: If box 1 is checked, check either box (a) or (b). ONLY CHECK BOX (b) WHEN THE FIRST REPLY WAS FILED WITHIN TWO MONTHS OF THE FINAL REJECTION. See MPEP 706.07(f).

Extensions of time may be obtained under 37 CFR 1.136(a). The date on which the petition under 37 CFR 1.136(a) and the appropriate extension fee have been filed is the date for purposes of determining the period of extension and the corresponding amount of the fee. The appropriate extension fee under 37 CFR 1.17(a) is calculated from: (1) the expiration date of the shortened statutory period for reply originally set in the final Office action; or (2) as set forth in (b) above, if checked. Any reply received by the Office later than three months after the mailing date of the final rejection, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

NOTICE OF APPEAL

2. ☐ The reply was filed after the date of filing a Notice of Appeal, but prior to the date of filing an appeal brief. The Notice of Appeal was filed on _____. A brief in compliance with 37 CFR 41.37 must be filed within two months of the date of filing the Notice of Appeal (37 CFR 41.37(a)), or any extension thereof (37 CFR 41.37(e)), to avoid dismissal of the appeal. Since a Notice of Appeal has been filed, any reply must be filed within the time period set forth in 37 CFR 41.37(a).

AMENDMENTS

3. ☒ The proposed amendment(s) filed after a final rejection, but prior to the date of filing a brief, will not be entered because
   (a) ☒ They raise new issues that would require further consideration and/or search (see NOTE below);
   (b) ☐ They raise the issue of new matter (see NOTE below);
   (c) ☒ They are not deemed to place the application in better form for appeal by materially reducing or simplifying the issues for appeal; and/or
   (d) ☐ They present additional claims without canceling a corresponding number of finally rejected claims.
   NOTE: *see attachment*. (See 37 CFR 1.116 and 41.33(a)).
4. ☐ The amendments are not in compliance with 37 CFR 1.121. See attached Notice of Non-Compliant Amendment (PTOL-324).
5. ☐ Applicant's reply has overcome the following rejection(s): _____.
6. ☐ Newly proposed or amended claim(s) _____ would be allowable if submitted in a separate, timely filed amendment canceling the non-allowable claim(s).
7. ☒ For purposes of appeal, the proposed amendment(s): a) ☒ will not be entered, or b) ☐ will be entered and an explanation of how the new or amended claims would be rejected is provided below or appended.
   The status of the claim(s) is (or will be) as follows:
   Claim(s) allowed: _____.
   Claim(s) objected to: _____.
   Claim(s) rejected: *45-73*.
   Claim(s) withdrawn from consideration: _____.

AFFIDAVIT OR OTHER EVIDENCE

8. ☐ The affidavit or other evidence filed after a final action, but before or on the date of filing a Notice of Appeal will not be entered because applicant failed to provide a showing of good and sufficient reasons why the affidavit or other evidence is necessary and was not earlier presented. See 37 CFR 1.116(e).
9. ☐ The affidavit or other evidence filed after the date of filing a Notice of Appeal, but prior to the date of filing a brief, will not be entered because the affidavit or other evidence failed to overcome all rejections under appeal and/or appellant fails to provide a showing a good and sufficient reasons why it is necessary and was not earlier presented. See 37 CFR 41.33(d)(1).
10. ☐ The affidavit or other evidence is entered. An explanation of the status of the claims after entry is below or attached.

REQUEST FOR RECONSIDERATION/OTHER

11. ☐ The request for reconsideration has been considered but does NOT place the application in condition for allowance because: _____.
12. ☐ Note the attached Information Disclosure Statement(s). (PTO/SB/08 or PTO-1449) Paper No(s). _____
13. ☐ Other: _____.

AVISORY ACTION

Introduction

1. Title is: HARDWARE SIMULATION SYSTEMS AND METHODS FOR VISION INSPECTION SYSTEMS
2. First named Inventor is: WASSERMAN.
3. Claims 45-73 are pending.
4. US application was filed on 2/3/99, and no earlier priority is claimed.
5. Applicant's after final amendments were received 3/11/05.

Important Prior Art and Definitions

6. **Stevenson** refers to "Modeling optical vision systems with innovative software" by Michael Stevenson et al., Vision Systems Design, January 1999, pages 29-35 (from IDS).
7. **Thomas** refers to US Patent 5,137,450 (from PTO form 892).
8. **Robotics** refers to "Robotics" (Understanding Computers series) by Time-Life Books, 1986, ISBN 0-8094-5969-6 (from PTO form 892). Note that some additional pages (19-25) were presented in the prior office action.

- **"off-line programming"** is defined at Specification page 2 as "describes the creation of a part program without interfering with ongoing operation of a physical vision inspection system".
- **Optimization** is defined as "[MATH] The maximizing or minimizing of a given function possibly subject to some type of constraints. [SYS ENG] 1. Broadly, the efforts and processes of making a decision, a design, or a system as perfect, effective, or functional as possible. 2. Narrowly, the specific methodology, techniques, and procedures used to decide on the one specific solution in a defined set of possible alternatives that will best satisfy a selected criterion. Also known as system optimization." by McGraw–Hill Dictionary of Scientific and Technical Terms, Fourth Edition.
- **Simulate** is defined as " [ENG] To mimic some or all of the behavior of one system with a different, dissimilar system, particularly with computers, models, or other equipment", by the McGraw-Hill Dictionary of Scientific and Technical Terms, Fourth Edition.

- **Simulation** is defined as "(1) The mathematical representation of the interaction of real-world objects. *See scientific applications.* (2) The execution of a machine language program designed to run in a foreign computer" by The Computer Desktop Encyclopedia by Alan Freedman, The Computer Language Company Inc., 1996. ISBN 0-8144-0010-8. Italics in original.
- **Simulation** is defined as "the imitation of the operation of a real-world process or system over time. Simulation involves the generation of an artificial history of the system and the observation of that artificial history to draw inferences concerning the operating characteristics of the real system that is represented. Simulation is an indispensable problem-solving methodology for the solution of many real-world problems. Simulation is used to describe and analyze the behavior of a system, ask what-if questions about the real system, and aid in the design of real systems. Both existing and conceptual systems can be modeled with simulation." by The Handbook of Simulation, Jerry Banks, 1998, pages 3-4.

Applicant Remarks

9. PROPOSED AMENDMENTS NOT ENTERED.
10. Applicant's proposed amendments are not entered.
11. Specifically, applicant proposes deleting the term "off-line programming". The prosecution history, to date, has focused extensively upon the term "off-line programming".
12. The record shows that a withdrawal of finality was previously granted based upon Applicant's assertions of the criticality of this term, which has led to protracted prosecution. Specifically, Applicant asserted that this term "breathed life" into the claims. Thus, the term "off-line programming" is critical to the interpretation of all of the other limitations, and the deletion of said term would result in reinterpretation of all other terms.
13. Deletion of the term "off-line programming" requires substantial reinterpretation and consideration and search regarding the other claim terms, and is not deemed to place the application in better form for appeal by materially reducing or simplifying the issues for appeal.
14. PRIOR ART REJECTION.
15. Applicant, at Remarks page 19, asserts that the claim 1 term "generate at least one control instruction" is not disclosed by Stevenson page 32 "This type of analysis also permits

designers to dissect the functional limitations inherent to their system. In this situation it is possible to decide the proper light-source intensity and position, imaging camera position, depth of focus, effective focal length, field of view, and CCD camera resolution".

16. Please note that Stevenson page 29 first column states "By designing computer models of these systems, they can be readily fine-tuned". Thus, Stevenson explicitly discloses fine-tuning the actual systems based upon the simulation results. Said fine-tuning implicitly includes generating control instructions, for example regarding the camera position or depth of focus.
17. Applicant, at Remarks page 19, asserts that Stevenson is only intended for "designing a layout or analyzing optical systems, not for controlling those systems". Possibly the Applicant intends some type of complex definition for the term "control instruction". However, it appears that designing a layout (an initial placement) is a control instruction.
18. Additionally, Stevenson must be interpreted in the context of Robotics. Note Robotics page 54 states "the most complex control… spray painting… path is defined by many thousands of incremental joint positions, each of which must be timed and coordinated… is difficult to choreograph simply by typing in programs at remote terminals. Therefore, as shown below, the robot arm must also be physically walked through its entire task by a human trainer".
19. Further, in view of Applicant's assertion (Remarks page 22) that Robotics is "on-line", note that the Robotics "teach pendant" (without the physical robot) may be combined with Stevenson's page 29 "computer simulation of optical vision systems", and thus avoid using any "on-line" physical robots or physical optical vision system.
20. Consider the following 3 types of programming. TYPE 1. Programming of a machine without the machine physically operating at the same time (without a simulation of the machine operating) is the simplest and default case for programming. TYPE 2. Programming while the machine is performing the steps simultaneously (see Robotics page 55 "teach pendant") is more advanced. TYPE 3. Programming using a simulation of the machine (see Stevenson page 29 "computer simulation of optical vision systems") is even more advanced.
21. Also note the implicit disclosure by Stevenson at page 32 "This type of analysis also permits designers to dissect the functional limitations inherent to their system. In this situation it is

possible to decide the proper light-source intensity and position, imaging camera position, depth of focus, effective focal length, field of view, and CCD camera resolution". Note that to "decide" the "proper" parameters implicitly means controlling them with instructions. If the machine vision being modeled by Stevenson is controlled by computers (which is implicit in a modern automobile manufacturing facility using robots), then said control would consist of writing new control instructions to computer control the proper parameters (for example, "imaging camera positions") as disclosed in great detail by Stevenson.

22. The remainder of this Advisory Action is copied directly from the prior final action.
23. OFF-LINE PROGRAMMING. At Remarks page 19, Applicant asserts that the term "off-line programming" is defined at Specification page 2 as **"describes the creation of a part [machine vision] program without interfering with ongoing operation of a physical vision inspection system".** The Examiner accepts and adopts this definition. However, this definition is indefinite.
24. POSITIVE LIMITATION. The positive limitation **"creation of a part program"** is interpreted as simply programming of a part (inspection) program. Note that "off-line" appears to be an adverb, and "programming" appears to be a verb. Thus, the use of the term "off-line programming system" in claim 45 preamble is indefinite. From the context of the claim, Applicant appears to intend a "machine" per 35 USC 101 statutory classes. Thus, it is not clear what machine elements (positive or negative limitations) are intended by the term "off-line programming system" in claim 45 preamble.
25. Applicant has repeatedly insisted that the preamble term "off-line programming" is essential to "breathe life" into the claim. However, the Examiner is unable to determine what these limitations definitely are.
26. Additionally, the three functional limitations that are explicitly stated in claim 45 "wherein the off-line programming system is operable to:... generate... display... generate" have been rejected against prior art. Thus, the Examiner is willing to consider any additional other positive functional limitations ("operable to") for the term "off-line programming" that the Applicant provides, if they are supported by the Specification.
27. NEGATIVE LIMITATION. The negative limitation **"without interfering with the ongoing operation of a physical vision inspection system"** is complex, and indefinite.

Negative limitations are not inherently ambiguous or uncertain, "So long as the boundaries of the patent protection sought are set forth definitely, albeit negatively, the claim complies with the requirements of 35 U.S.C. 112, second paragraph" per MPEP 2173.05(i).

28. However, the negative limitation "without interfering..." is not adequately defined. Consider the "remote control device called a teach pendant" discussed at Robotics page 55. If a manufacturing line is shut down every night for maintenance, and the "teach pendant" is used at night with an assembly line robot, would that satisfy the negative limitation "without interfering"? In the Examiner's opinion, this type of potential dual use may be the Applicant's intent.
29. If a programmer used a "remote control device called a teach pendant" and a brand new robot that was located in a research and development lab (not on an assembly line), would that satisfy the limitation "without interfering"?
30. Similarly, if a programmer locked himself in a closet with a laptop computer (running Stevenson's simulation software, and then using the results to amend the robot's program written in C+), would this satisfy the negative limitation "without interfering"?
31. Possibly the Applicant may wish to explicitly define the term "interfering", and then the term "without interfering" would be defined as everything that did not interfere.
32. **Alternately, the Applicant may wish to explicitly state the negative limitation in the claim. For example, "further, wherein the off-line programming system is <u>not</u> operable to:"** This type of explicit negative limitation would be very useful.
33. PREAMBLE. Thus, the Examiner is willing to attach limitations to the preamble terms. However, the limitations must be definite, and the Applicant must explain why these limitations are not already contained in the simultaneous use of the term in the explicit limitations of the claim ("wherein the off-line programming system is operable to:..."). In other words, please explain what additional limitations are in the preamble that are not already in the explicit limitations. If there are no additional limitations in the preamble, then it is not persuasive to assert that the preamble term is necessary to "breathe life" into the claim.
34. Please note that in Pitney Bowes Inc. v. Hewlett-Packard Co (CA FC) 51 UspQ2d 1161 (1999), the preamble term "producing on a photoreceptor an image of generated shapes made

up of spots" was not repeated in the remainder of the claim. Thus, the present claims are distinguished from Pitney Bowes.

35. Also, in Pitney Bowes the claim was part of an issued patent, and thus held a presumption of validity. The present claims are not part of an issued patent, and thus do not hold a presumption of validity. Thus, the present claims are again distinguished from Pitney Bowes. It appears preferable to explicitly state limitations outside of the preamble if the issue is raised during prosecution.

36. Further, it would be indefinite for the preamble term to have meaning different from the same term used later in the explicit limitations of the claim. Does the Applicant assert that the preamble term has a different meaning from the same term used later in the same claim? If the Applicant does not make this assertion, then it appears that continued discussion of the preamble is moot. If Applicant does make this assertion, then an additional grounds for the indefiniteness rejection will be introduced.

37. Please note that the prosecution of the present application would have been much more compact and efficient if any desired limitations would have been explicitly listed after the preamble.

38. CONTROL INSTRUCTION. Applicant has deleted the term "control instruction", thus the relevant 35 USC 112 rejections are withdrawn.

39. REJECTIONS UNDER 35 USC 103. ROBOTICS PRIOR ART. At Remarks page 22, the Applicant asserts that the Robotics prior art is "on-line" because it requires the physical presence of a robot. However, applicant's definition at Specification page 2 of "off-line programming" ("describes the creation of a part program without interfering with ongoing operation of a physical vision inspection system".) Applicant's definition does not explicitly exclude operation of an actual manufacturing robot during evenings (when the assembly line is shut down, and thus is not "ongoing"). Further, Applicant's definition does not explicitly exclude operation of a research robot which is identical to the manufacturing robot, and thus does not interfere with the ongoing operation of a (manufacturing) physical vision system.

40. Additionally, even if Applicant's definition was interpreted as excluding the physical presence of any robots, then the other prior art (particularly the vision simulation of Stevenson) clearly discloses programming (for example, the position of lights) of a

corresponding machine vision system without the physical presence of a robot (or the actual physical system).

41. Note that historically, simple software programs are written independently of the robot. For example, Robotics page 54 states "the most complex control... spray painting... path is defined by many thousands of incremental joint positions, each of which must be timed and coordinated... is difficult to choreograph simply by typing in programs at remote terminals. Therefore, as shown below, the robot arm must also be physically walked through its entire task by a human trainer". In other words, the interactive physical use of a robot for programming is the exceptional case (for "the most complex control"), and not the usual case.
42. Thus, Robotics page 54 discloses both cases: the simple case of "typing in programs" without the robot physically operating, and the complex case of "physically walked through its entire task by a human trainer".
43. For the purposes of the 35 USC 103 art rejections below, claim limitations E1-E3 are interpreted as being "off-line programming", and the Stevenson prior art is also interpreted as being "off-line programming".
44. Consider the following 3 types of programming. TYPE 1. Programming of a machine without the machine physically operating at the same time (without a simulation of the machine operating) is the simplest and default case for programming. TYPE 2. Programming while the machine is performing the steps simultaneously (see Robotics page 55 "teach pendant") is more advanced. TYPE 3. Programming using a simulation of the machine (see Stevenson page 29 "computer simulation of optical vision systems") is even more advanced.
45. REDUNDANT REJECTION. There is one more issue regarding the Robotics prior art in claim 45. Note that the claim 45 rejection contains a second (or redundant, or parallel) rejection of the limitation D "instruction" based upon Stevenson. In other words, one of ordinary skill in the art would interpret Stevenson page 29 "computer simulation of optical vision systems" as implicitly intended for designing and/or controlling the actual physical system which is being simulated. Note Stevenson's page 29 term "readily fine tuned or even

constructed", which appears to disclose adjusting an existing machine vision system (or even designing a new machine vision system) based upon the results of the Stevenson simulation.

46. See paragraph 35 of the prior office action. Applicant has not addressed Stevenson with respect to the limitation D "instruction".

47. THOMAS PRIOR ART. At Remarks page 23, Applicant asserts that the Thomas flight simulator relates to a different field of invention than a programmable machine vision inspection system, because the flight simulator "necessarily" requires an extraordinary level of similarity to the corresponding machine, whereas "it is not obvious that in the field of machine vision systems the same extraordinary level of similarity could be technically feasible..." This is not persuasive. Momentarily ignoring financial considerations, the usefulness of a flight simulator and the usefulness of a machine vision simulator are both directly dependent upon the level of similarity between the simulator and the actual machine that is being simulated.

48. NEW CLAIM 73. New claim 73 is addressed in the rejections below.

35 USC § 112-Second Paragraph-indefinite claims

49. The following is a quotation of the second paragraph of 35 U.S.C. 112: The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

50. Claim 45-73 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

51. CLAIMS 45-73. The term the term "off-line programming" is defined at Specification page 2 as "describes the creation of a part program without interfering with ongoing operation of a physical vision inspection system". This definition is accepted and adopted by the Examiner for claim interpretation. However, this definition is indefinite. See above detailed discussion.

52. CLAIM 69. Additionally, claim 69 is rejected as indefinite because MPEP 2173.05(p)(II) states: "A single claim which claims both an apparatus [machine] and the method steps [process] of using the apparatus is indefinite... *Ex parte Lyell*... should also be rejected under 35 USC 101". In claim 69, the preamble term is "system" which is ambiguous with

respect to the 35 USC 101 statutory classes, the first limitation is "a user interface" which appears to be a "machine" per 35 USC 101, and another limitation states "the method comprising" which appears to be a "process" per 35 USC 101. Thus, claim 69 is rejected as indefinite, and is also rejected under 35 USC 101 below.

53. CLAIM 73. Additionally, new claim 73 is further rejected as indefinite due the term "a first portion of a machine vision inspection system" in the preamble, and the term "The first portion of the machine vision inspection system" after the preamble. There is no indication in the preamble or after the preamble of what is intended to be contained in said "first portion" of the machine inspection system".
54. Similarly in new claim 73, it is not clear what is intended to be included in "second portion".
55. Claim 73 would be much more clear if all intended limitations were are expressly and hierarchically listed after the preamble, for example: A, B1, B2, B3, and so forth. This hierarchical listing would probably eliminate any ambiguity regarding the number of limitations, and regarding the hierarchical relationship between the limitations.

35 USC § 101-statutory subject matter-Ex parte Lyell

56. 35 U.S.C. 101 reads as follows: Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.
57. Claim 69 is rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter.
58. In claim 69: the preamble term is "system" is ambiguous with respect to the 35 USC 101 statutory classes, the first limitation is "a user interface" which appears to be a "machine" per 35 USC 101, and another limitation states "the method comprising" which appears to be a "process" per 35 USC 101.
59. See MPEP 2173.05(p)(II), which states:

> A single claim which claims both an apparatus and the method steps of using the apparatus is indefinite under 35 U.S.C. 112, second paragraph. In Ex parte Lyell, 17 USPQ2d 1548 (Bd. Pat. App. & Inter. 1990), a claim directed to an automatic transmission workstand and the method steps of using it was held to be ambiguous and properly rejected under 35 U.S.C. 112, second paragraph.
> Such claims should also be rejected under 35 U.S.C. 101 based on the theory that the claim is directed to neither a "process" nor a "machine," but rather embraces or overlaps two different statutory classes of invention set forth in 35 U.S.C. 101 which is drafted so as to set forth the statutory classes of invention in the alternative only. Id. at 1551.

Claim Rejections - 35 USC § 103

60. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action: A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.
61. The factual inquiries set forth in *Graham* v. *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows: Determining the scope and contents of the prior art. Ascertaining the differences between the prior art and the claims at issue. Resolving the level of ordinary skill in the pertinent art. Considering objective evidence present in the application indicating obviousness or nonobviousness.
62. Claims 45-72 are rejected under 35 U.S.C. 103(a) as being unpatentable.
63. <u>Claim 45 is rejected</u> under 35 U.S.C. 103(a) as being unpatentable over Stevenson in view of Robotics.
64. Claim 45 is an independent "system" claim, with 5 limitations labeled A-E by the Examiner for clarity. Note that A has three subparts, B has 2 subparts, and E has 3 subparts. Said subparts are numerically labeled by the Examiner for clarity.
65. A1-**user interface... display a synthetic image representative of an image acquired by the corresponding machine vision inspection system** is disclosed by Stevenson at page 29 "Quality-control optical vision systems can be conveniently simulated and analyzed using software technology... simulate and analyze almost any optical vision system with high geometric and photometric accuracy". Note the car models displayed (synthetic images) at page 29 and page 30. Further note that these displays show tool bars and legends which are part of the user interface. 31
66. A2-[user interface...] **at least one control element that affects the focus** is disclosed by Stevenson at page 32 "This type of analysis also permits designers to dissect the functional limitations inherent to their system. In this situation it is possible to decide the proper light-source intensity and position, imaging camera position, depth of focus, effective focal length, field of view, and CCD camera resolution".
67. A3-[user interface...] **input portion for receiving CAD data** is disclosed by Stevenson at page 30 "This allows objects characterized in the Rhinoceros 3-D modeling program to be imported into ASAP for further analysis."

68. B1-**hardware component simulation system... first portion... including a limited depth of field of the lense system** is disclosed by Stevenson at page 32 "functional limitations inherent to their system. In this situation it is possible to decide the proper light-source intensity and position, imaging camera position, depth of focus, effective focal length, field of view, and CCD camera resolution".
69. B2-[hardware component simulation system]... **second portion... relative position** is disclosed by Stevenson at page 32 "functional limitations inherent to their system. In this situation it is possible to decide the proper light-source intensity and position, imaging camera position, depth of focus, effective focal length, field of view, and CCD camera resolution".
70. C-**communication interface... between the user interface and the hardware component simulation system** is inherently disclosed by Stevenson at page 32 "functional limitations inherent to their system. In this situation it is possible to decide the proper light-source intensity and position, imaging camera position, depth of focus, effective focal length, field of view, and CCD camera resolution". Note that the displays at pages 29 and 30 inherently have a communication interface between the display monitor and the simulation system. Similarly, the keyboard and/or mouse which is used to interact with the toolbars inherently has a communication interface between the display monitor and the simulation system.
71. E1-**the off-line programming system is operable to... focus dependent synthetic image... based on at least 2 of a current state of the user-alterable control elements [focus], the current lens system representation of the first portion [depth of field], and the current state representation of the second portion [relative position]** is disclosed by Stevenson at page 32 "This type of analysis also permits designers to dissect the functional limitations inherent to their system. In this situation it is possible to decide the proper light-source intensity and position, imaging camera position, depth of focus, effective focal length, field of view, and CCD camera resolution".
72. E2-**display the current focus-dependent synthetic image** is disclosed by Stevenson at page 29 "Quality-control optical vision systems can be conveniently simulated and analyzed using software technology... simulate and analyze almost any optical vision system with high

geometric and photometric accuracy". Note the car models displayed (synthetic images) at page 29 and page 30.

73. E3-**generate at least one control instruction** is disclosed by Stevenson at page 32 "This type of analysis also permits designers to dissect the functional limitations inherent to their system. In this situation it is possible to decide the proper light-source intensity and position, imaging camera position, depth of focus, effective focal length, field of view, and CCD camera resolution". Note that to "decide" the "proper" parameters inherently means controlling them with instructions.
74. The additional limitations are not expressly disclosed by Stevenson.
75. D-**usable to generate at least one of the instructions** is disclosed by Robotics page 54 states "the most complex control… spray painting… path is defined by many thousands of incremental joint positions, each of which must be timed and coordinated… is difficult to choreograph simply by typing in programs at remote terminals. Therefore, as shown below, the robot arm must also be physically walked through its entire task by a human trainer". In other words, the interactive physical use of a robot for programming is the exceptional case (for "the most complex control"), and not the usual case.
76. Thus, Robotics page 54 discloses both cases: the simple case of "typing in programs" without the robot physically operating, and the complex case of "physically walked through its entire task by a human trainer".
77. Further, in view of Applicant's assertion (Remarks page 22) that Robotics is "on-line", note that the Robotics "teach pendant" (without the physical robot) may be combined with Stevenson's page 29 "computer simulation of optical vision systems", and thus avoid using any "on-line" physical robots or physical optical vision system.
78. Consider the following 3 types of programming. TYPE 1. Programming of a machine without the machine physically operating at the same time (without a simulation of the machine operating) is the simplest and default case for programming. TYPE 2. Programming while the machine is performing the steps simultaneously (see Robotics page 55 "teach pendant") is more advanced. TYPE 3. Programming using a simulation of the machine (see Stevenson page 29 "computer simulation of optical vision systems") is even more advanced.

79. Also note the implicit disclosure by Stevenson at page 32 "This type of analysis also permits designers to dissect the functional limitations inherent to their system. In this situation it is possible to decide the proper light-source intensity and position, imaging camera position, depth of focus, effective focal length, field of view, and CCD camera resolution". Note that to "decide" the "proper" parameters implicitly means controlling them with instructions. **If the machine vision being modeled by Stevenson is controlled by computers (which is implicit in a modern automobile manufacturing facility using robots), then said control would consist of writing new control instructions to computer control the proper parameters (for example, "imaging camera positions") as disclosed in great detail by Stevenson.**
80. **At the time** the invention was made, it would have been obvious to a person of ordinary skill in the art to use Robotics to modify Stevenson. One of ordinary skill in the art would have been motivated to do this to implement Stevenson's machine vision simulation analysis of optimized parameters ("decide the proper light source intensity…") in a modern computer controlled factory using robots, as displayed in Robotics pages 21-25 and 54-55. Although not quite inherent, it is implicit that Stevenson's complex focus dependent machine vision simulation results will be implemented in a physical machine vision system that is controlled with computers. See the definitions of "simulation" and "optimization" given above.
81. <u>Claims 46-73 are rejected</u> under 35 U.S.C. 103(a) as being unpatentable over Stevenson in view of Robotics and Thomas.
82. In claim 46, **"includes at least one instruction that determines that a focus dependent actual inspection image…"** is disclosed by Stevenson at page 32 "This type of analysis also permits designers to dissect the functional limitations inherent to their system. In this situation it is possible to decide the proper light-source intensity and position, imaging camera position, depth of focus, effective focal length, field of view, and CCD camera resolution". Note that Webster defines "depth of focus" as "the range of distances of the image behind a camera lens or other image-forming device measured along the axis of the device throughout which the image has acceptable sharpness". Thus, any part of an object positioned in the "depth of focus" will have "acceptable sharpness". Additionally, note page

34 states "every optical-vision system has unique values determining its formal range of best focus".

83. In claim 47, **"control element that affects the focus of the synthetic image appears and operates substantially similarly to a control element included in a user interface of the corresponding machine vision inspection system"** is disclosed by Thomas at FIG 3. Note that the Thomas flight simulator substantially duplicates the user interface of the actual airplane, including the control panel and control elements. Note Column 5 line 39 states "simulated heads-up display to complete the simulation for a typical tactical fighter". Thus, it is well known in the art to simulate the user interface as closely as possible for training purposes, even down to the pilot's chair.
84. In claim 48, **"the at least one control element that affects the focus of the synthetic image comprises at least one of a) a focusing control element... b) a motion control element"** is disclosed by Stevenson at page 32 "This type of analysis also permits designers to dissect the functional limitations inherent to their system. In this situation it is possible to decide the proper light-source intensity and position, imaging camera position, depth of focus, effective focal length, field of view, and CCD camera resolution". Note that "light-source... position" implies that the light-source may be moved. Note that "imaging cameral position" implies that the camera position may be moved. Further, note that it is inherent that adjusting focus requires physically moving the physical lenses.
85. In claim 49, **"plurality of lenses",** is disclosed by Stevenson at page 32 "This type of analysis also permits designers to dissect the functional limitations inherent to their system. In this situation it is possible to decide the proper light-source intensity and position, imaging camera position, depth of focus, effective focal length, field of view, and CCD camera resolution". Note that if the physical system contained a plurality of lenses, then the analysis would inherently model the plurality of lenses. Further note that the use of lenses in series is well known in the art (telescopes), and the use of swapping lenses in a system is also well known in the art (microscopes).
86. In claim 50, "displays **a modified current focus dependent synthetic image in response to a modification of at least one of a) the current state of the user-alterable control elements..."** is disclosed by Stevenson at page 32 "This type of analysis also permits

designers to dissect the functional limitations inherent to their system. In this situation it is possible to decide the proper light-source intensity and position, imaging camera position, depth of focus, effective focal length, field of view, and CCD camera resolution". Note that Claim 45 limitation A2 defines "user-alterable control elements" as "comprising at least one control element that affects the focus".

87. Claim 51 contains three additional limitations:
88. A-**user interface including user-alterable control elements and an image display portion** is disclosed by Stevenson at the figure on page 29. Note the toolbars that form part of the graphical user interface.
89. B-**the user interface of the off-line programming system is substantially similar to the user interface of the corresponding machine vision inspection system** is disclosed by Thomas at FIG 3. Note that the Thomas flight simulator substantially duplicates the user interface of the actual airplane, including the control panel and control elements. Note Column 5 line 39 states "simulated heads-up display to complete the simulation for a typical tactical fighter". Thus, it is well known in the art to simulate the user interface as closely as possible for training purposes, even down to the pilot's chair. If the actual system being replicated contained a graphical user interface, then the simulation trainer would also have a similar graphical user interface. Additionally, note that Specification page 1 line 21 states "Off-line programming software tools are popular". The phrase "off-line" implies that the actual user interface is used, while only the measuring machines and robots are simulated.
90. C-**majority of the user-alterable control elements typically appear and operate substantially similarly in both the off-line programming system and the corresponding machine vision inspection system** is disclosed by Thomas at FIG 3. Note that the Thomas flight simulator substantially duplicates the user interface of the actual airplane, including the control panel and control elements. Additionally, note that Specification page 1 line 21 states "Off-line programming software tools are popular". The phrase "off-line" implies that the actual user interface is used, while only the measuring machines and robots are simulated.
91. Claim 52 contains three additional limitations:
92. A-**a third portion operable to represent a current state of a lighting system of the corresponding machine vision inspection system** is disclosed by Stevenson at page 32

"This type of analysis also permits designers to dissect the functional limitations inherent to their system. In this situation it is possible to decide the proper light-source intensity and position, imaging camera position, depth of focus, effective focal length, field of view, and CCD camera resolution".

93. B-**the user alterable control elements comprise at least one control element that affects the apparent lighting in the synthetic image representative of an image acquired by the corresponding machine vision system** is disclosed by Stevenson at page 32 "This type of analysis also permits designers to dissect the functional limitations inherent to their system. In this situation it is possible to decide the proper light-source intensity and position, imaging camera position, depth of focus, effective focal length, field of view, and CCD camera resolution". Note that Stevenson's "decide the proper light-source intensity" inherently implies a control element that affects the apparently lighting.

94. C-**the off-line programming system is operable to generate the current focus-dependent synthetic image based on at least three of [1] a current state of the user alterable control elements, [2] the current lens system representative of the first portion [represent at least a current lens system... including a limited depth of field of the lens system], [3] the current state representation of the second portion [represent a current state of at least the relative position] and [4] the current representation of the third portion [represent a current lighting system]** is disclosed by Stevenson at page 32 "This type of analysis also permits designers to dissect the functional limitations inherent to their system. In this situation it is possible to decide the proper light-source intensity and position, imaging camera position, depth of focus, effective focal length, field of view, and CCD camera resolution". Note Stevenson discloses all four of the sub-limitations (1 through 4). Further note that Stevenson's term "decide" means that Stevenson's listed factors are alterable, and that a current representation is generated based upon the current state of each factor.

95. In claim 53, **"the at least one control element that affects the apparent lighting in the synthetic image comprises a user-alterable control element of the corresponding machine vision inspection system, such that the at least one control element that affects the apparent lighting in the synthetic image appears and operates substantially**

similarly in both the off-line programming system and the machine vision inspection system is disclosed by Stevenson at page 32 "This type of analysis also permits designers to dissect the functional limitations inherent to their system. In this situation it is possible to decide the proper light-source intensity and position, imaging camera position, depth of focus, effective focal length, field of view, and CCD camera resolution". Note that some of Stevenson's parameters apper to be user-alterable, such as light-source position, and imaging camera position. Also see Stevenson page 30 "These features enable designers to visualize all the key elements of their system's optical performance".

96. In claim 54, there are four additional limitations.
97. A-**input operation instructions which are substantially similar to the... corresponding machine vision inspection system** is disclosed by Thomas at FIG 3. Note that the Thomas flight simulator substantially duplicates the user interface of the actual airplane, including the control panel and control elements. The physical user interface is duplicated, and the input operation instructions are implicitly duplicated as well. Note that Thomas' goal is "realistic flight simulation" at Column 1 line 17.
98. B-**hardware component simulation system processes the input operation instructions in order to generate the current focus-dependent synthetic image** is disclosed by Stevenson at page 32 "This type of analysis also permits designers to dissect the functional limitations inherent to their system. In this situation it is possible to decide the proper light-source intensity and position, imaging camera position, depth of focus, effective focal length, field of view, and CCD camera resolution".
99. C-**the user-alterable control elements include elements operable to input image inspection operation instructions substantially similar to at least one control instruction usable in the inspection program** is disclosed by Thomas at FIG 3. Note that the Thomas flight simulator substantially duplicates the user interface of the actual airplane, including the control panel and control elements. The physical user interface is duplicated, and the input operation instructions are implicitly duplicated as well. Note that Thomas' goal is "realistic flight simulation" at Column 1 line 17.
100. D-**hardware component simulation system generates the current focus-dependent synthetic image... substantially similar to... the corresponding machine vision**

inspection system is disclosed by Thomas at FIG 3. Note that the Thomas flight simulator substantially duplicates the user interface of the actual airplane, including the control panel and control elements. The physical user interface is duplicated, and the input operation instructions are implicitly duplicated as well. Note that Thomas' goal is "realistic flight simulation" at Column 1 line 17.

101. **At the time** the invention was made, it would have been obvious to a person of ordinary skill in the art to use Thomas to modify Stevenson. One of ordinary skill in the art would have been motivated to do this to improve the training efficiency of the simulation by simulating the entire system as closely possible. Additionally, simply copying the user interface software modules into the simulation system would save developmental time.

102. In claim 55, there are with 6 limitations labeled A-F by the Examiner. Limitation A has 2 subparts, C has 2 subparts, and F has 3 subparts.

103. A1-**user interface... display a synthetic image** is disclosed by Stevenson at page 29 "Quality-control optical vision systems can be conveniently simulated and analyzed using software technology... simulate and analyze almost any optical vision system with high geometric and photometric accuracy". Note the car models displayed (synthetic images) at page 29 and page 30. Further note that these displays show tool bars and legends which are part of the user interface.

104. A2-[user interface...] **at least a first control element that affects the focus** is disclosed by Stevenson at page 32 "This type of analysis also permits designers to dissect the functional limitations inherent to their system. In this situation it is possible to decide the proper light-source intensity and position, imaging camera position, depth of focus, effective focal length, field of view, and CCD camera resolution".

105. A3-[user interface...] **at least a second control element... image inspection operation** is disclosed by Stevenson at page 30 "visual geometry inspection" and page 35 "searches the image for hot spots".

106. B-**input portion for receiving CAD data** is disclosed by Stevenson at page 30 "This allows objects characterized in the Rhinoceros 3-D modeling program to be imported into ASAP for further analysis."

107. C1-**hardware component simulation system... first portion... including a limited depth of field of the lens system** is disclosed by Stevenson at page 32 "functional limitations inherent to their system. In this situation it is possible to decide the proper light-source intensity and position, imaging camera position, depth of focus, effective focal length, field of view, and CCD camera resolution".

108. C2-[hardware component simulation system]... **second portion... relative position** is disclosed by Stevenson at page 32 "functional limitations inherent to their system. In this situation it is possible to decide the proper light-source intensity and position, imaging camera position, depth of focus, effective focal length, field of view, and CCD camera resolution".

109. D-**communication interface... between the user interface and the hardware component simulation system** is inherently disclosed by Stevenson at page 32 "functional limitations inherent to their system. In this situation it is possible to decide the proper light-source intensity and position, imaging camera position, depth of focus, effective focal length, field of view, and CCD camera resolution". Note that the displays at pages 29 and 30 inherently have a communication interface between the display monitor and the simulation system. Similarly, the keyboard and/or mouse which is used to interact with the toolbars inherently has a communication interface between the display monitor and the simulation system.

110. E-**generate the instructions** is disclosed by Stevenson at page 32 "This type of analysis also permits designers to dissect the functional limitations inherent to their system. In this situation it is possible to decide the proper light-source intensity and position, imaging camera position, depth of focus, effective focal length, field of view, and CCD camera resolution". Note that to "decide" the "proper" parameters inherently means controlling them with instructions.

111. F1-is operable to... focus dependent synthetic image... based on **at least 2 of a current state of the user-alterable control elements [focus], the current lens system representation of the first portion [depth of field], and the current state representation of the second portion [relative position]** is disclosed by Stevenson at page 32 "This type of analysis also permits designers to dissect the functional limitations inherent to their system.

In this situation it is possible to decide the proper light-source intensity and position, imaging camera position, depth of focus, effective focal length, field of view, and CCD camera resolution".

112. F2-**display the current focus-dependent synthetic image** is disclosed by Stevenson at page 29 "Quality-control optical vision systems can be conveniently simulated and analyzed using software technology… simulate and analyze almost any optical vision system with high geometric and photometric accuracy". Note the car models displayed (synthetic images) at page 29 and page 30.

113. F3-**perform an inspection operation based on the current focus-dependent synthetic image** is disclosed by Stevenson at page 30 "visual geometry inspection" and page 35 "searches the image for hot spots".

114. In claim 56, **"generate at least one control instruction usable in an inspection program"** is disclosed by Robotics figures and text on page 54 and 55, especially the top right figure on page 55 which states "using a remote control device called a teach pendant, a trainer maneuvers a robot to one of many desired positions". Note that Robotics was supplied to the Applicant with the prior office action. Also see Stevenson at page 30 "visual geometry inspection" and page 35 "searches the image for hot spots", which implicitly would be implemented on the actual physical system using computer controls, if the machine vision system was in a modern manufacturing facility.

115. In claim 57, there are 5 limitations labeled A-E by the Examiner. Limitation A has 4 subparts, C has 2 subparts, and E has 3 subparts.

116. A1-**"user interface… substantially similar to the graphical user interface of the corresponding machine vision inspection system… display a synthetic image"** is disclosed by Thomas at FIG 3. Note that the Thomas flight simulator substantially duplicates the user interface of the actual airplane, including the control panel and control elements. The physical user interface is duplicated, and any graphical user interface is implicitly duplicated as well. Note that Thomas' goal is "realistic flight simulation" at Column 1 line 17. One of ordinary skill in the art would understand that realistic simulation requires duplicating all interfaces as exactly as possible, including graphical user interfaces. Note that graphical user interfaces are well known in the art, and are defined by Computer User

Dictionary (1998) as "A type of environment that represents programs, files, and options by means of icons, menus, and dialog boxes on the screen. The user can select and activate these options by pointing and clicking with a mouse or, often, by using the keyboard…".

117. A2-[user interface…] **at least one control element that affects the focus** is disclosed by Stevenson at page 32 "This type of analysis also permits designers to dissect the functional limitations inherent to their system. In this situation it is possible to decide the proper light-source intensity and position, imaging camera position, depth of focus, effective focal length, field of view, and CCD camera resolution".

118. A3-[user interface…] **at least one control element… image inspection operation** is disclosed by Stevenson at page 30 "visual geometry inspection" and page 35 "searches the image for hot spots".

119. A4-**the majority of the user-alterable control elements appear and operate substantially similarly…** is disclosed by Thomas at FIG 3. Note that the Thomas flight simulator substantially duplicates the user interface of the actual airplane, including the control panel and control elements. The physical user interface is duplicated, and any graphical user interface is implicitly duplicated as well. Note that Thomas' goal is "realistic flight simulation" at Column 1 line 17. One of ordinary skill in the art would understand that realistic simulation requires duplicating all interfaces as exactly as possible, including the control elements.

120. B-**input portion for receiving CAD data** is disclosed by Stevenson at page 30 "This allows objects characterized in the Rhinoceros 3-D modeling program to be imported into ASAP for further analysis."

121. C1-**hardware component simulation system… first portion… including a limited depth of field of the lens system** is disclosed by Stevenson at page 32 "functional limitations inherent to their system. In this situation it is possible to decide the proper light-source intensity and position, imaging camera position, depth of focus, effective focal length, field of view, and CCD camera resolution".

122. C2-[hardware component simulation system]… **second portion… relative position** is disclosed by Stevenson at page 32 "functional limitations inherent to their system. In this situation it is possible to decide the proper light-source intensity and position, imaging

camera position, depth of focus, effective focal length, field of view, and CCD camera resolution".

123. D-**communication interface... between the user interface and the hardware component simulation system** is inherently disclosed by Stevenson at page 32 "functional limitations inherent to their system. In this situation it is possible to decide the proper light-source intensity and position, imaging camera position, depth of focus, effective focal length, field of view, and CCD camera resolution". Note that the displays at pages 29 and 30 inherently have a communication interface between the display monitor and the simulation system. Similarly, the keyboard and/or mouse which is used to interact with the toolbars inherently has a communication interface between the display monitor and the simulation system.

124. E1-is operable to... focus dependent synthetic image... based on **at least 2 of a current state of the user-alterable control elements [focus], the current lens system representation of the first portion [depth of field], and the current state representation of the second portion [relative position]** is disclosed by Stevenson at page 32 "This type of analysis also permits designers to dissect the functional limitations inherent to their system. In this situation it is possible to decide the proper light-source intensity and position, imaging camera position, depth of focus, effective focal length, field of view, and CCD camera resolution".

125. E2-**display the current focus-dependent synthetic image** is disclosed by Stevenson at page 29 "Quality-control optical vision systems can be conveniently simulated and analyzed using software technology... simulate and analyze almost any optical vision system with high geometric and photometric accuracy". Note the car models displayed (synthetic images) at page 29 and page 30.

126. E3-**perform an image inspection operation based on the current focus-dependent synthetic image** is disclosed by Stevenson at page 30 "visual geometry inspection" and page 35 "searches the image for hot spots".

127. In claim 58, **"plurality of lenses"** is disclosed by Stevenson at page 29 "Quality-control optical vision systems can be conveniently simulated". The mathematics of multiple lenses

in series is well known in the art, and common in telescopes and cameras. Additionally, swapping multiple lenses is well known in devices such as microscopes.

128. In claim 59, **"at least one of a) the current state of the user-alterable control elements [focus], b) the current lens system representation of the first portion [depth of field], and c) the current state representation of the second portion [relative position]"** is disclosed by Stevenson at page 32 "This type of analysis also permits designers to dissect the functional limitations inherent to their system. In this situation it is possible to decide the proper light-source intensity and position, imaging camera position, depth of focus, effective focal length, field of view, and CCD camera resolution".

129. Claim 60 has three additional limitations:

130. A-**"current state of a lighting system"** is disclosed by Stevenson at page 32 "This type of analysis also permits designers to dissect the functional limitations inherent to their system. In this situation it is possible to decide the proper light-source intensity and position, imaging camera position, depth of focus, effective focal length, field of view, and CCD camera resolution".

131. B-**"at least one control element that affects the apparent"** is disclosed by Stevenson at page 32 "This type of analysis also permits designers to dissect the functional limitations inherent to their system. In this situation it is possible to decide the proper light-source intensity and position, imaging camera position, depth of focus, effective focal length, field of view, and CCD camera resolution".

132. C-**"based on at least three of a) the current state of the user-alterable control elements [focus], b) the current lens system representation of the first portion [depth of field], and c) the current state representation of the second portion [relative position] and the current state representation of the third portion [image inspection]"** is disclosed by Stevenson at page 32 "This type of analysis also permits designers to dissect the functional limitations inherent to their system. In this situation it is possible to decide the proper light-source intensity and position, imaging camera position, depth of focus, effective focal length, field of view, and CCD camera resolution" and page 30 "visual geometry inspection" and page 35 "searches the image for hot spots". Note that the Examiner is interpreting "third portion" as meaning "image inspection" in view of parent claim 57.

133. In claim 61, **"a plurality of lights"** is disclosed by Stevenson at page 32 "This type of analysis also permits designers to dissect the functional limitations inherent to their system. In this situation it is possible to decide the proper light-source intensity and position, imaging camera position, depth of focus, effective focal length, field of view, and CCD camera resolution". Although Stevenson does not explicitly disclose a plurality of lights, the Examiner takes Official Notice that multiple lights are often used in photography, and are necessary to clearly illuminate complex three dimensional objects. One of ordinary skill in the art of optical vision systems would be familiar with the use of multiple lights. Also note MPEP 2144.04(VI)(B). *In re Harza,* 274 F.2d 669, 124 USPQ 378, 380 (CCPA 1960) states "It is well settled that the mere duplication of parts has no patentable significance unless a new and unexpected result is produced".

134. The Applicant is entitled to traverse the official notice according to MPEP § 2144.03. However, MPEP § 2144.03 further states "See also In re Boon, 439 F.2d 724, 169 USPQ 231 (CCPA 1971) (a challenge to the taking of judicial notice must contain adequate information or argument to create on its face a reasonable doubt regarding the circumstances justifying the judicial notice)." Specifically, In re Boon, 169 USPQ 231, 234 states "as we held in Ahlert, an applicant must be given the opportunity to challenge either the correctness of the fact asserted or the notoriety or repute of the reference cited in support of the assertion. We did not mean to imply by this statement that a bald challenge, with nothing more, would be all that was needed". Further note that 37 CFR § 1.671(c)(3) states "Judicial notice means official notice". Thus, a traversal by the Applicant that is merely "a bald challenge, with nothing more" will be given very little weight.

135. In claim 62, 3 additional limitations:

136. A-**user-alterable control elements [focus]... substantially similar to...** is disclosed by Stevenson at page 32 "This type of analysis also permits designers to dissect the functional limitations inherent to their system. In this situation it is possible to decide the proper light-source intensity and position, imaging camera position, depth of focus, effective focal length, field of view, and CCD camera resolution".

137. B-**generate the current focus-dependent synthetic image** is disclosed by Stevenson at page 32 "This type of analysis also permits designers to dissect the functional limitations

inherent to their system. In this situation it is possible to decide the proper light-source intensity and position, imaging camera position, depth of focus, effective focal length, field of view, and CCD camera resolution", and the displayed images at page 29 and page 30.

138. **C-generates the current focus-dependent synthetic image in a form which is operable with the at least one control element which is operable to perform an image inspection operation based on the current focus-dependent synthetic image to provide an off-line environment for training a part program based on a focus-dependent synthetic image that is substantially similar** is disclosed by Stevenson at page 32 "This type of analysis also permits designers to dissect the functional limitations inherent to their system. In this situation it is possible to decide the proper light-source intensity and position, imaging camera position, depth of focus, effective focal length, field of view, and CCD camera resolution", and Stevenson page 30 "These features enable designers to visualize all the key elements of their system's optical performance", and Stevenson page 29 "fine-tune".

139. In claim 63, **"instructions... based at least partially on the current state of the user-alterable control elements"** is disclosed by Stevenson at page 32 "This type of analysis also permits designers to dissect the functional limitations inherent to their system. In this situation it is possible to decide the proper light-source intensity and position, imaging camera position, depth of focus, effective focal length, field of view, and CCD camera resolution". Note that Stevenson's term "decide the proper... " means that the simulated system is used to determine the "proper" settings or control instructions for the actual system.

140. In claim 64, **"external view"** is disclosed by Stevenson at page 32 "This type of analysis also permits designers to dissect the functional limitations inherent to their system. In this situation it is possible to decide the proper light-source intensity and position, imaging camera position, depth of focus, effective focal length, field of view, and CCD camera resolution".

141. In claim 65, 4 limitations A-D. Limitation A has 2 subparts, B has 2 subparts, and D has 4 subparts:

142. A1-**user interface... display a synthetic image representative of an image** is disclosed by Thomas at FIG 3, and at Column 5 line 39 "simulated heads-up display". Note that the simulated heads-up display includes machine vision images such as radar acquired artificial

horizon and enemy fighters. Note that the Thomas flight simulator substantially duplicates the user interface of the actual airplane, including the control panel and control elements. The physical user interface is duplicated, and any graphical user interface is implicitly duplicated as well. Note that Thomas' goal is "realistic flight simulation" at Column 1 line 17. One of ordinary skill in the art would understand that realistic simulation requires duplicating all interfaces as exactly as possible, including graphical user interfaces. Note that graphical user interfaces are well known in the art, and are defined by Computer User Dictionary (1998) as "A type of environment that represents programs, files, and options by means of icons, menus, and dialog boxes on the screen. The user can select and activate these options by pointing and clicking with a mouse or, often, by using the keyboard…".

143. A2-[user interface…] **at least one control element that affects the focus** is disclosed by Stevenson at page 32 "This type of analysis also permits designers to dissect the functional limitations inherent to their system. In this situation it is possible to decide the proper light-source intensity and position, imaging camera position, depth of focus, effective focal length, field of view, and CCD camera resolution".

144. B1-**hardware component simulation system… first portion… including a limited depth of field of the lens system** is disclosed by Stevenson at page 32 "functional limitations inherent to their system. In this situation it is possible to decide the proper light-source intensity and position, imaging camera position, depth of focus, effective focal length, field of view, and CCD camera resolution".

145. B2-**hardware component simulation system… second portion… relative position** is disclosed by Stevenson at page 32 "functional limitations inherent to their system. In this situation it is possible to decide the proper light-source intensity and position, imaging camera position, depth of focus, effective focal length, field of view, and CCD camera resolution".

146. C-**communication interface… between the user interface and the hardware component simulation system** is inherently disclosed by Stevenson at page 32 "functional limitations inherent to their system. In this situation it is possible to decide the proper light-source intensity and position, imaging camera position, depth of focus, effective focal length, field of view, and CCD camera resolution". Note that the displays at pages 29 and 30

inherently have a communication interface between the display monitor and the simulation system. Similarly, the keyboard and/or mouse which is used to interact with the toolbars inherently has a communication interface between the display monitor and the simulation system.

147. D1-**inputting CAD data** is disclosed by Stevenson at page 30 "This allows objects characterized in the Rhinoceros 3-D modeling program to be imported into ASAP for further analysis."

148. D2- **focus dependent synthetic image... based on at least 2 of a current state of the user-alterable control elements [focus], the current lens system representation of the first portion [depth of field], and the current state representation of the second portion [relative position]** is disclosed by Stevenson at page 32 "This type of analysis also permits designers to dissect the functional limitations inherent to their system. In this situation it is possible to decide the proper light-source intensity and position, imaging camera position, depth of focus, effective focal length, field of view, and CCD camera resolution".

149. D3-**displaying** is disclosed by Stevenson at page 29 figure and page 30 figures.

150. D4-**generating at least one control instruction... based at least partially on the current state of the user-alterable control elements [focus]** is disclosed by Stevenson at page 32 "This type of analysis also permits designers to dissect the functional limitations inherent to their system. In this situation it is possible to decide the proper light-source intensity and position, imaging camera position, depth of focus, effective focal length, field of view, and CCD camera resolution" and page 30 "visual geometry inspection" and page 35 "searches the image for hot spots".

151. In claim 66, **"altering the at least one control element that affects the focus of the synthetic image"** is disclosed by Stevenson at page 32 "This type of analysis also permits designers to dissect the functional limitations inherent to their system. In this situation it is possible to decide the proper light-source intensity and position, imaging camera position, depth of focus, effective focal length, field of view, and CCD camera resolution".

152. In claim 67, **"displaying a modified current focus-dependent synthetic image... at least one of a) the current state of the user-alterable control elements [focus], b) the current lens system representation of the first portion [depth of field], and c) the**

current state representation of the second portion [relative position]" is disclosed by Stevenson at page 32 "This type of analysis also permits designers to dissect the functional limitations inherent to their system. In this situation it is possible to decide the proper light-source intensity and position, imaging camera position, depth of focus, effective focal length, field of view, and CCD camera resolution" and page 30 "visual geometry inspection" and page 35 "searches the image for hot spots".

153. In claim 68, **"at least one control element... image inspection operation"** is disclosed by Stevenson at page 32 "This type of analysis also permits designers to dissect the functional limitations inherent to their system. In this situation it is possible to decide the proper light-source intensity and position, imaging camera position, depth of focus, effective focal length, field of view, and CCD camera resolution" and page 30 "visual geometry inspection" and page 35 "searches the image for hot spots".

154. In claim 69, 7 limitations A-G. Limitation A has 4 subparts, B has 2 subparts:

155. A1-**user interface... display a synthetic image representative of an image acquired by the corresponding machine vision inspection system** is disclosed by Thomas at FIG 3, and at Column 5 line 39 "simulated heads-up display". Note that the simulated heads-up display includes machine vision images such as radar acquired artificial horizon and enemy fighters. Note that the Thomas flight simulator substantially duplicates the user interface of the actual airplane, including the control panel and control elements. The physical user interface is duplicated, and any graphical user interface is implicitly duplicated as well. Note that Thomas' goal is "realistic flight simulation" at Column 1 line 17. One of ordinary skill in the art would understand that realistic simulation requires duplicating all interfaces as exactly as possible, including graphical user interfaces. Note that graphical user interfaces are well known in the art, and are defined by Computer User Dictionary (1998) as "A type of environment that represents programs, files, and options by means of icons, menus, and dialog boxes on the screen. The user can select and activate these options by pointing and clicking with a mouse or, often, by using the keyboard...".

156. A2-[user interface...] **at least one control element that affects the focus** is disclosed by Stevenson at page 32 "This type of analysis also permits designers to dissect the functional limitations inherent to their system. In this situation it is possible to decide the proper light-

source intensity and position, imaging camera position, depth of focus, effective focal length, field of view, and CCD camera resolution".

157. A3-[user interface...] **at least one control element... image inspection** is disclosed by Stevenson at page 30 "visual geometry inspection" and page 35 "searches the image for hot spots".

158. A4-**majority of the user-alterable control elements [focus] and image processing tools typically appear and operate substantially similarly** is disclosed by Thomas at FIG 3. Note that Thomas' goal is "realistic flight simulation" at Column 1 line 17. One of ordinary skill in the art would understand that realistic simulation requires duplicating all interfaces as exactly as possible, including control elements and image processing tools.

159. B1-**hardware component simulation system... first portion... depth of field** is disclosed by Stevenson at page 32 "This type of analysis also permits designers to dissect the functional limitations inherent to their system. In this situation it is possible to decide the proper light-source intensity and position, imaging camera position, depth of focus, effective focal length, field of view, and CCD camera resolution".

160. B2-**second portion... relative position and the [third] portion... inspection** is disclosed by Stevenson at page 32 "This type of analysis also permits designers to dissect the functional limitations inherent to their system. In this situation it is possible to decide the proper light-source intensity and position, imaging camera position, depth of focus, effective focal length, field of view, and CCD camera resolution" and page 30 "visual geometry inspection" and page 35 "searches the image for hot spots".

161. C-**communication interface... between the user interface and the hardware component simulation system** is inherently disclosed by Stevenson at page 32 "functional limitations inherent to their system. In this situation it is possible to decide the proper light-source intensity and position, imaging camera position, depth of focus, effective focal length, field of view, and CCD camera resolution". Note that the displays at pages 29 and 30 inherently have a communication interface between the display monitor and the simulation system. Similarly, the keyboard and/or mouse which is used to interact with the toolbars inherently has a communication interface between the display monitor and the simulation system.

162. D-**inputting CAD data** is disclosed by Stevenson at page 30 "This allows objects characterized in the Rhinoceros 3-D modeling program to be imported into ASAP for further analysis."

163. E-**focus-dependent synthetic image... based on at least 2 of a current state of the user-alterable control elements [focus], the current lens system representation of the first portion [depth of field], and the current state representation of the second portion [relative position]** is disclosed by Stevenson at page 32 "This type of analysis also permits designers to dissect the functional limitations inherent to their system. In this situation it is possible to decide the proper light-source intensity and position, imaging camera position, depth of focus, effective focal length, field of view, and CCD camera resolution".

164. F-**displaying the current focus-dependent synthetic image** is disclosed by Stevenson at page 29 "Quality-control optical vision systems can be conveniently simulated and analyzed using software technology... simulate and analyze almost any optical vision system with high geometric and photometric accuracy". Note the car models displayed (synthetic images) at page 29 and page 30.

165. G-**operating at least one control element which is operable to perform an inspection operation** is disclosed by Stevenson at page 32 "This type of analysis also permits designers to dissect the functional limitations inherent to their system. In this situation it is possible to decide the proper light-source intensity and position, imaging camera position, depth of focus, effective focal length, field of view, and CCD camera resolution" and page 30 "visual geometry inspection" and page 35 "searches the image for hot spots".

166. Stevenson does not expressly disclose the remaining limitations (A1 and A4).

167. In claim 70, **"displaying a modified current focus-dependent synthetic image... at least one of a) the current state of the user-alterable control elements [focus], b) the current lens system representation of the first portion [depth of field], and c) the current state representation of the second portion [relative position]"** is disclosed by Stevenson at page 32 "This type of analysis also permits designers to dissect the functional limitations inherent to their system. In this situation it is possible to decide the proper light-source intensity and position, imaging camera position, depth of focus, effective focal length,

field of view, and CCD camera resolution" and page 30 "visual geometry inspection" and page 35 "searches the image for hot spots".

168. In claim 71, **"focus-dependent synthetic image on the current state representation of the third portion [lighting]"** is disclosed by Stevenson at page 32 "This type of analysis also permits designers to dissect the functional limitations inherent to their system. In this situation it is possible to decide the proper light-source intensity and position, imaging camera position, depth of focus, effective focal length, field of view, and CCD camera resolution".

169. In claim 72, **"inspection"** is disclosed by Stevenson at page 30 "visual geometry inspection" and page 35 "searches the image for hot spots".

170. MOTIVATION FOR CLAIMS 46-72. At the time the invention was made, it would have been obvious to a person of ordinary skill in the art to use Robotics and Thomas to modify Stevenson. Stevenson discloses a highly detailed machine vision simulation (with focus), which is intended to design, and analyze, and optimize actual physical machine vision systems. One of ordinary skill in the art would be motivated to implement the simulation results from Stevenson in a modern manufacturing environment by using Robotics' robots (with associated computers) to physically move the camera and lights around a car (for example), much in the same way that the Robotics paint gun is moved at the end of a robot arm. Note that many of Stevenson's figures are car related, and that Robotics' paint guns are commonly used to paint new cars. In view of the figures, Stevenson's simulation appears especially intended for analyzing the fresh paint in new cars.

171. Further, one of ordinary skill in the art would be motivated to use Thomas to make the user interface (including graphical user interface, and physical user interface, and related instructions) of the simulation similar to the user interface of the actual physical system being simulated for three reasons: first, it saves time and money to use the user interface software module from the actual physical system rather than to devise and design a new interface for the simulation. Second, it is preferable to use the same interface in simulation in order to more realistically train the human operator. Third, using the same interface in simulation facilitates future training of the actual physical system by the operator (per Robotics page 54

where the operator is training the robot using a "teach pendant"). Thus, the simulation may be used to "train" both the operator and the actual physical system.

Conclusion

172. All pending claims stand rejected.

173. The Examiner requests clarification regarding the claim 45 preamble term "off-line programming". Specifically, Applicant repeatedly asserts that said preamble term introduces additional limitations required to breathe life into the claim. However, the term "off-line programming" also occurs several other places in claim 45 outside of the preamble.

174. If Applicant intends that the preamble term is necessary to breathe life into the claim, then that implies that the preamble term has additional limitations not present outside of the preamble.

175. It would be indefinite (per 35 USC 112) for the preamble term to have a meaning that is different from the same term used outside of the preamble. Does the Applicant assert that the preamble term has a different meaning from the same term used later in the same claim? If the Applicant does not make this assertion, then it appears that continued discussion of the preamble is moot. If Applicant does make this assertion, then an additional grounds for the indefiniteness rejection will be introduced. Please clarify this issue.

Communication

176. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Eduardo Garcia-Otero whose telephone number is 571-272-3711. The examiner can normally be reached on Monday through Thursday from 9:00 AM to 8:00 PM. If attempts to reach the Examiner by telephone are unsuccessful, the Examiner's supervisor, Kevin Teska, can be reached at 571-272-3761. The fax phone number for this group is 703-872-9306. Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the group receptionist, whose telephone number is (703) 305-3900.

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SUPERVISORY
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